

of this dust in the upper air has been regarded as the probable cause of the remarkably brilliant sunsets of the following winter and spring over a large part of the earth's surface.⁶¹ One of the most stupendous outpourings of volcanic ashes on record took place, after a quiescence of 26 years, from the volcano Coseguina, in Nicaragua, during the early part of the year 1835. On that occasion, utter darkness prevailed over a circle of 35 miles radius, the ashes falling so thickly that, even 8 leagues from the mountain, they covered the ground to a depth of about 10 feet. It was estimated that the rain of dust and sand fell over an area at least 270 geographical miles in diameter. Some of the finer materials, thrown so high as to come within the influence of an upper air-current, were borne away eastward, and fell, four days afterward, at Kingston, in Jamaica—a distance of 700 miles. During the great eruption of Sumbawa, in 1815, the dust and stones fell over an area of nearly one million square miles, and were estimated by Zollinger to amount to fully fifty cubic miles of material, and by Junghuhn to be equal to one hundred and eighty-five mountains like Vesuvius. Toward the end of the 18th century, during a time of great disturbance among the Japanese volcanoes, one of them, Sakurajima, threw out so much pumiceous material that it was possible to walk a distance of 23 miles upon the floating débris in the sea.

An inquiry into the origin of these showers of fragmentary materials brings vividly before us some of the essential features of volcanic action. We find that bombs, slags, and lapilli may be thrown up in comparatively tranquil states of a volcano, but that the showers of fine dust are discharged

⁶¹ Royal Society Report, pp. 151–463.